

REMARKS

Claims 5-6 currently appear in this application. The Office Action of June 28, 2005, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicants respectfully request favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

Election/Restrictions

It is noted that the restriction requirement has been made final.

Rejections under 35 U.S.C. 112

Claims 1-2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are said to be narrative and indefinite, failing to conform to current U.S. practice.

This rejection is respectfully traversed. Claims 1 and 2 have been replaced by new claims 4 and 5. It is believed that these new claims conform to the requirements of 35 U.S.C. 112 and are devoid of grammatical or syntactical errors.

It should be appreciated that the invention claimed in claim 5 is not directed to a method for making an intermediate sheet. Rather, when a preparatory sheet intermediate is passed between a pair of rollers for rolling, a thin sheet intermediate with a reduced thickness is obtained. This thin sheet intermediate is to be made into a sheet electrode for an electric double layer capacitor. Accordingly, the claimed invention is directed to a method for making a sheet electrode of an electrode double layer capacitor by roller-rolling the preparatory sheet intermediate.

The invention claimed in claim 6 is directed to the process of claim 5 including a slitting step conducted when the sheet intermediate is wound on a winding section after the sheet is rolled. Thin sheets obtained by roller rolling as in claim 6 have different widths and sometimes include a part having a lower density on the end than in the rest of the sheet. Accordingly, the thin sheet intermediate needs to be slit so that the ends of the sheet are removed and so that the sheet has a predetermined width. In order to make this clear, claim 6 has been submitted in lieu of claim 2.

Art Rejections

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masanori. The Examiner alleges

that Masanori discloses a method for making an electrode for an electrical double layer capacitor. In the process, an activated carbon fiber and polymer resin, propylene glycol and PTFE are said to be mixed and kneaded to obtain a rubber like viscous mixture which is rolled by a roll to obtain a sheet of a prescribed thickness. The examiner states that it would have been obvious to one skilled in the art at the time the invention was made that the sheet be slit for sizes required for the product size dimensions and that the sheet be rolled onto a winding section to preserve the product made.

This rejection is respectfully traversed. Masanori describes a technique for making a preparatory sheet thinner by roller rolling. More specifically, a sheet electrode used in an electrode double layer capacitor is conventionally obtained by roller-rolling a rubber-like viscous intimate mixture of carbon powder, PTFE binder, and a liquid lubricant. However, when the thickness of the sheet is reduced by roller rolling, adhesion of the liquid lubricant folds the sheet such that the folded sheet is adhered together in some parts. Thus, since handling the sheet is substantially impossible when the sheet is thinned, the thickness of the sheet cannot be reduced to 0.6 mm. To overcome this problem, Masanori removes the liquid lubricant from the preparatory sheet and, thereafter, the preparatory sheet is rolled using heated

rollers which have a temperature greater than room temperatures. Since the liquid lubricant is removed by this process, the preparatory sheet loses viscosity. As a result, the preparatory sheet can be handled more easily.

Furthermore, since the rollers are heated to be above room temperature, the PTFE in the preparatory sheet is heated to above its transition temperature, so that elongation of the preparatory sheet is suddenly increased. Consequently, the preparatory sheet can be rolled without cracking, following up deformation during rolling. Masanori discloses that the thickness of the sheet electrode can be reduced to 0.6 mm or below.

However, other problems remain unsolved in the process described by Masanori. The present invention is directed to overcoming those problems. Thus, the process of the herein claimed invention differs from the process disclosed by Masanori in the problem to be solved as well as the apparatus used to overcome the problem. More specifically, in the roller rolling, a preparatory sheet is consecutively fed between a pair of rollers while a constant tension is applied to the preparatory sheet. In this case, when the tension is not applied to the preparatory sheet uniformly across the width of the sheet, the sheet meanders

such that the sheet is cracked in parts that are pulled more strongly because of the varying width of the sheet.

To overcome this problem, the present invention draws the preparatory sheet out of a drawing section under a predetermined tension applied to the preparatory sheet, and controlling a widthwise position of the preparatory sheet immediately before the rolling rollers by providing an edge position controller. This edge position controller controls the width of the preparatory sheet immediately before the sheet approaches the rolling rollers. Consequently, since this process prevents the preparatory sheet from meandering in the interval between the drawing section and the rolling rollers, a uniform tension is applied to the preparatory sheet widthwise. This prevents cracking of the preparatory sheet.

Furthermore, the sheet intermediate (sheet electrode for electric double layer capacitor) that has been rendered thinner by the roller rolling is wound onto a winding section (bobbin). In this case, the diameter of the sheet intermediate wound on the winding section increase as the winding progresses. The increase in diameter of the wound sheet intermediate varies with tension applied to the sheet intermediate when the sheet intermediate is drawn from the roll, whereupon the thinned sheet intermediate cracks.

The present invention is also directed to solving the problem of cracking during winding. For this purpose, a winding side drive roller is provided adjacent to the winding section so as to be rotated at a predetermined speed. The thinned sheet intermediate is wound on the winding section while being pressed against the winding side drive roller by a predetermined pressure. In this arrangement, the winding side drive roller rotated at a constant speed rotates the winding section. Accordingly, even if the diameter of the sheet intermediate wound on the winding section becomes larger as winding progresses, the winding section winds the thinned sheet intermediate at a constant speed. Consequently, since the sheet intermediate is wound onto the winding section under predetermined tension applied thereto, there is no possibility of cracking occurring.

Thus, the present invention is directed to a problem which is neither discussed nor suggested by Masanori. Moreover, Masanori discloses or suggests nothing about the method of the present invention to overcome the problem.

In a further embodiment of the present invention, the sheet intermediate thinned by the roller rolling sometimes has a non-uniform width or has a low-density section in an edge thereof. The process of claim 6 provides a method for removing these edges of the sheet intermediate. For this

purpose, the process of claim 6 provides for slitting both widthwise ends of the rolled sheet intermediate lengthwise so that the sheet intermediate has a predetermined width. During the slitting, the rolled sheet intermediate is caught onto and adhered to the drive roller, and a slitting blade is pressed against a part of the intermediate sheet adhered to the drive roller.

There is nothing in Masanori that discloses or suggests pressing slitting blade against a drive roller so that the widthwise ends of the sheet intermediate are removed, so that the sheet intermediate has a uniform width.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

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